

WHAT IS CLAIMED IS:

1. An apparatus for reusing a slurry effluent containing agglomerations of abrasive grains which has been used in a polishing step in the manufacture of a semiconductor,
5 comprising:

a crusher for crushing the agglomerations of abrasive grains contained in the slurry effluent; and

a regeneration unit for regenerating an abrasive fluid using the slurry effluent containing the crushed abrasive
10 grains.

2. The apparatus according to claim 1, wherein the crusher includes at least one of a mill, an ultrasonic oscillator and a pressurizing circulation unit.

3. The apparatus according to claim 2, wherein the
15 crusher includes an agitator for agitating the slurry effluent to cause the crushed abrasive grains to be dispersed in the slurry effluent.

4. The apparatus according to claim 1, further comprising a concentrating unit for concentrating the slurry
20 effluent processed by the crusher.

5. The apparatus according to claim 4, wherein the

concentrating unit includes a concentrating membrane for separating the slurry effluent into a concentrate fluid and a permeate fluid.

5 6. The apparatus according to claim 5, wherein the concentrating unit includes a plurality of concentrating paths respectively having a plurality of concentrating membranes.

7. The apparatus according to claim 5, wherein the concentrating unit includes:

10 a temperature regulator for adjusting the temperature of the slurry effluent; and

a concentration controller for controlling the temperature regulator to control the concentration of the concentrate fluid.

15 8. The apparatus according to claim 7, wherein the concentration controller includes a flow rate detecting unit for detecting the flow rate of the concentrate fluid and for controlling the temperature regulator based on the detected flow rate.

20 9. The apparatus according to claim 7, wherein the concentration controller controls the temperature regulator so that the concentration of the concentrate fluid is substantially the same as the concentration of a fresh slurry

fluid.

10. The apparatus according to claim 5, further comprising a circulation channel provided between the concentrating unit and a polishing device, for providing the concentrate fluid as a regenerated slurry fluid from the concentrating unit to the polishing device.

11. The apparatus according to claim 4, further comprising fluid quality regulator provided between the crusher and the concentrating unit, for receiving the slurry effluent from the crusher and regulating the quality of the slurry effluent.

12. The apparatus according to claim 11, wherein the fluid quality regulator includes a specific gravity adjusting unit for adjusting the concentration of abrasive grains in the slurry effluent.

13. The apparatus according to claim 11, wherein the fluid quality regulator includes a pH adjusting unit for adjusting the pH of the slurry effluent.

14. The apparatus according to claim 5, further comprising a filter unit provided downstream of the concentrating unit, for filtering the concentrate fluid.

15. The apparatus according to claim 14, wherein the filter unit includes a plurality of filtering paths respectively having a plurality of filters.

5 16. The apparatus according to claim 5, further comprising:

a chamber provided downstream of the concentrating unit, for temporarily storing the permeate fluid; and

a back washing unit for cleansing the concentrating membrane using the permeate fluid stored in the chamber.

10 17. The apparatus according to claim 16, wherein the back washing unit includes a gas purger for purging a gas into the chamber, and wherein the gas is an inert gas which prevents oxidation of the permeate fluid.

15 18. The apparatus according to claim 16, wherein the concentrating unit includes a plurality of concentrating paths respectively having a plurality of concentrating membranes, and the chamber and the back washing unit are provided to correspond to the plurality of concentrating membranes.

20 19. The apparatus according to claim 5, further comprising a slurry feeder for receiving the permeate fluid from the concentrating unit and preparing a regenerated slurry fluid using the permeate fluid.

20. A crusher for crushing agglomerations of abrasive grains contained in a slurry effluent which has been used in the manufacture of a semiconductor comprising:

a tank for storing the slurry effluent; and

5 at least one of a mill, an ultrasonic oscillator and a pressurizing circulation unit attached to the tank.

21. The crusher according to claim 20, further comprising an agitator attached to the tank, for agitating the slurry effluent to cause the crushed abrasive grains to be dispersed
10 in the slurry effluent.

22. An apparatus for concentrating a slurry effluent, comprising:

a concentrating unit including a concentrating membrane for separating the slurry effluent into a concentrate fluid and
15 a permeate fluid;

a temperature regulator for adjusting the temperature of the slurry effluent; and

a concentration controller for controlling the temperature regulator to control the concentration of the concentrate
20 fluid.

23. The apparatus according to claim 22, wherein the concentration controller includes a flow rate detecting unit for detecting the flow rate of the concentrate fluid and for

controlling the temperature regulator based on the detected flow rate.

24. An apparatus for regulating the quality of a slurry effluent including abrasive grains, comprising:

- 5 a tank for storing the slurry effluent; and
a specific gravity adjusting unit for adjusting the concentration of the abrasive grains in the slurry effluent.

25. An apparatus for regulating the quality of a slurry effluent including abrasive grains, comprising:

- 10 a tank for storing the slurry effluent; and
a pH adjusting unit for adjusting the pH of the slurry effluent.

26. An apparatus for cleansing a concentrating membrane used in a concentrating a slurry effluent, a concentrate fluid and a permeate fluid generated by concentrating the slurry effluent, the apparatus comprising:

- 15 a chamber for temporarily storing the permeate fluid; and
a back washing unit for cleansing the concentrating membrane using the permeate fluid stored in the chamber.

20 27. The apparatus according to claim 26, wherein the back washing unit includes a gas purger for purging a gas into the chamber, and wherein the gas is an inert gas which prevents

oxidation of the permeate fluid.

28. The apparatus according to claim 26, wherein the concentrating membrane includes a plurality of concentrating membranes, and the chamber and the back washing unit are provided to correspond to the plurality of concentrating membranes.

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29. A method of reuse of a slurry effluent containing agglomerations of abrasive grains which has been used in a polishing step in the manufacture of a semiconductor, comprising the steps of:

crushing the agglomerations of abrasive grains contained in the slurry effluent using at least one process selected from the group consisting of a mill process and an ultrasonic oscillation process; and

regenerating an abrasive fluid using the slurry effluent containing the crushed abrasive grains.

30. The method according to claim 29, wherein the crushing step includes agitating the slurry effluent to cause the crushed abrasive grains to be dispersed in the slurry effluent.

31. The method according to claim 29, further comprising the step of concentrating the slurry effluent subsequent to the

crushing step.

32. The method according to claim 31, further comprising the step of regulating the quality of the slurry effluent between the crushing step and the concentrating step.

5 33. The method according to claim 32, wherein the quality regulating step includes adjusting the concentration of abrasive grains in the slurry effluent.

10 34. The method according to claim 33, wherein the quality regulating step includes adjusting the pH of the slurry effluent.

35. The method according to claim 31, wherein the concentrating step includes separating the slurry effluent into a concentrate fluid and a permeate fluid using a concentrating membrane.

15 36. The method according to claim 35, wherein the concentrating step includes controlling the concentration of the concentrate fluid by adjusting the temperature of the slurry effluent.

20 37. The method according to claim 35, wherein the concentration of the concentrate fluid is controlled to be

substantially the same as the concentration of a fresh slurry fluid.

5 38. The method according to claim 35, wherein the concentrating step is performed using a plurality of concentrating membranes disposed in a plurality of concentrating paths.

39. The method according to claim 38, further comprising the step of cleansing a plurality of concentrating membranes in a time offset manner using the permeate fluid.

10 40. The method according to claim 35, further comprising the step of cleansing the concentrating membrane using the permeate fluid.

15 41. The method according to claim 40, wherein the cleansing step includes purging a gas into a storage chamber which temporarily stores the permeate fluid to cause the permeate fluid to be ejected toward the concentrating membrane, and wherein the gas is an inert gas which prevents oxidation of the permeate fluid.

20 42. The method according to claim 35, further comprising the step of filtering the concentrate fluid.